中国氢能源标准的制订和执行

The formulation and implementation of China's hydrogen energy standards

1．新经济浪潮推动了新能源的开发

- 新的经济浪潮对能源需求的日益增加。
- 全球经济的一体化进程，对新能源的开发产生了支持、推动和刺激作用。
- 世界范围的能源消耗在增加，其中大部分采用化石燃料。
- 化石燃料引起了全球性的环境问题，例如酸雨和全球变暖。
- 开发利用新能源与可再生能源是一条符合发展趋势的可行之路。

1. A new economic surge drives the development of sustainable energy resources

- A new economy surge's demands for energy resources increases day by day.
- The global economic integration has a supporting and promoting effect to the development of sustainable energy resources.
- The whole world's energy resources consumption, mainly the fossil fuel, is increasing continuously.
- Fossil fuel caused the global environmental problem,
- Such as acid rain and global warming.
- For solving the environmental pollution problem completely,
- To utilize new and sustainable energy resources is the only route coinciding with world's developing tendency.

2. 氢能源的开发势在必行

- 由于对环境的影响最小，氢能，应该得到很大程度的依赖。
- 氢能的开发利用，首先必须解决氢源问题。
- 大量廉价氢的生产是实现氢能利用的根本。
- 其次，安全、高效、高密度、低成本的储氢技术，是将氢能利用推向实用化、规模化的关键。
- 最后，是氢的利用的安全、可靠和高效。

2. Development of hydrogen energy resources is necessary

- Hydrogen energy resources should be depended in a large extent
- Because of its less negative action to the environment
- As the prerequisite of utilizing hydrogen energy, its resources must be solved at first
- The production of great amount of cheap hydrogen is the foundation of hydrogen application
- In addition, a safe and efficient storage of hydrogen at low cost and high density
- is the key to realize practical hydrogen energy utilization of scale
- Finally, application of hydrogen must be safe, reliable and efficient

3．氢能技术及其应用的开发研究已经开始

- 发达国家投入了大量资金开展氢能技术及其应用的开发研究和应用试验。
- 中国的政府机关、研究机构、高等院校以及企业，也开展氢能技术的基础研究，特别是以燃料电池汽车为代表的氢能应用技术开发研究。

3. The research and development of hydrogen technology starts

- Hydrogen energy technology has turned from lab research to the practical utilization.
- The developed countries have paid a closer attention to
- The hydrogen energy's development and its applications
- Chinese government, research institutes, universities and enterprises have put great effort and time into the research and development of hydrogen technology
- especially into the test and application of fuel cell powered automobiles

4. 氢能源国家标准的制定正处于起草和征求意见阶段

- 中国国家标准制定程序划分为九个阶段：
- 预阶段、立项阶段、起草阶段、征求意见阶段、审查阶段、批准阶段、出版阶段、复审阶段和废止阶段
- 中国氢能源国家标准的制定，有的处于起草和征求意见阶段。
- 有的还处于预阶段和立项阶段。

4. China's hydrogen energy standards are being in the processes of drafting and comments soliciting

- The procedure of China's national standards' formulation is divided into nine processes
- The preparation, the program confirming, drafting, the comments soliciting, the examining, the approving, pressing, re-examining and at last, its abolishment process
- Nowadays China's hydrogen energy standards are being in the processes of
- drafting and comments soliciting
- Some others are being in their preparation and program confirming processes

5. 部分氢能源国家标准的制定可能采用快速程序以提高效率

- 按照法律规定，对下列情况，制定国家标准可以采用快速程序：
- 对等同采用、等效采用国际标准或国外先进标准的标准制、修订项目，可直接由立项阶段进入征求意见阶段，省略起草阶段。
- 对现有国家标准的修订项目或中国其他各级标准的转化项目，可直接由立项阶段进入审查阶段，省略起草阶段和征求意见阶段。
- 部分氢能源国家标准的制定可以采用快速程序，以提高制订效率。

5. Some national standards of hydrogen energy technology may adopt quick procedures

- According to China's relevant law and regulation, the formulation of national standards under following circumstances is suitable to several quick procedures
- For equivalent adoption or interchangeable adoption of criterion systems or revised items from an international standard and a foreign advanced standard, a quick procedure may omit the drafting process to start from a comments soliciting process directly
- For existing national standards' revision or transforming program from existing domestic standards at lower stages, a quick procedure may omit drafting and comments' soliciting processes to start from a examining process directly.
- Some national standards of hydrogen energy technology will adopt quick procedures to raise the formulation efficiency.

6. 制订氢能源标准首先是制订技术标准

- 技术标准是指对标准化领域中需要协调统一的技术事项所制定的标准。
- 包括基础技术标准、产品标准、工艺标准、检测试验方法标准，及安全、卫生、环保标准等。
- 制订氢能源标准首先是制订技术标准。
- 管理标准和工作标准是第二步的工作。

6. The first task of hydrogen energy standard formulation is for technology standards

- The technology standards are criterions for the technological affairs that should be cooperated and integrated in a standardization scope
- They includes standards of basic technology, of products, of technique, of examining and testing methods, together with criterions for safety, hygiene and environment, etc.
- The first task of hydrogen energy standards' formulation is for its technology standards
- The formulation of management standards and operation standards are the tasks at second step

7．制订氢能源标准的第一步是建立国家标准

- 按照等级，中国标准分为国家标准、行业标准、地方标准和企业标准四级
  对需要在全国范畴内统一的技术要求，应当制定国家标准
- 制订氢能源技术标准的第一步是建立国家技术标准
- 行业标准、地方标准和企业标准容后再立

7. The first task of hydrogen energy technology standards' formulation is for its national standards

- China's standards' constitution is at four stages, national standards, trade standards, local standards and enterprise standards
- National standards shall be formulated for the technical requirements that need to be unified nationwide
- The first task of hydrogen energy technology standards' formulation is for its national technology standards
- The formulation of trade standards, local standards and enterprise standards are the tasks at second step

8. 国际标准化是不可或缺的

- 标准化是沟通国际贸易和国际技术合作的技术纽带。
- 通过标准化能够很好地解决商品交换中的质量、安全、可靠性和互换性配套等问题。
- 标准化的程度直接影响到贸易中技术壁垒的形成和消除。
- 因此，参与国际标准化活动在我国的标准活动中享有优先权。

8. The international standardization is vital and requisite

- International standardization is a technological tie to link the international trade and to strengthen the international cooperation
- The problems of quality, safety, reliability and changeability from commodity exchange can be solved by means of standardization
- The extent of standardization has a direct effect on the formation and elimination of technology barrier in trade process
- And so, to participate in international standardization activities has a very high priority within our standards activity

9．中国已成为国际氢技术标准委员会的正式成员

- 自2002年以来，中国已成为ISO/TC197 氢技术标准委员会的正式成员国。
- 经中国标准管理委员会批准，中国标准研究院资源与环境标准化研究所成为ISO/TC197 氢技术标准委员会的归口单位。

9. China has become a formal member country of ISO/TC 197 for Hydrogen Technology Standardization

- Since 2002, China has become a formal member country of ISO/TC 197 Technical Committee for Hydrogen Technology Standardization.
- Upon the approval of Standardization Administration of China, the Research Center of Energy and Environmental Standardization under China National Institute of Standardization is the counterpart organization to the ISO/TC 197 Technical Committee for Hydrogen Technology Standardization

10. 制订氢能源标准工作的起步

- 为了满足国内氢能源技术发展的需要，我国的科研机构和高校在氢能源技术标准上进行了积极的探索。
- 为了加快中国氢技术标准的发展，根据中国标准管理委员会的批准，若干氢技术国家标准的建立及修订已经被批准列入了国家计划。

10. The beginning of the hydrogen energy standards formulation

- To meet the needs of the development of hydrogen energy technology, some research institute and universities have conducted an active documentation on the hydrogen energy technology standardization.
- To speed up the development of China hydrogen technology standardization, upon the approval of Standardization Administration of China (SAC), several national standards and specifications for hydrogen technology had been listed in the “Program For Establishment and Revision of National Standards in 2003” released by the State Standardization Managing Committee.

11. 制订氢能源标准的总任务

- 按照中华人民共和国标准化法规定：
- 标准化工作的任务是制定标准
- 组织实施标准和对标准的实施进行监督

11. The general task for Formulation of hydrogen energy resources standards

- According to the Regulations for the Implementation of the Standardization Law of the People's Republic of China
- The task for those who are in charge of standardization work is:
- Formulating standards
- Organizing the implementation of standards and
- Exercising supervision over the implementation of standards

12. 制订氢能源标准的目标

- 制订氢能源标准的工作目标是，
- 为大规模开发和利用氢能源过程中的各个环节，
- 包括生产、储运和利用提出统一的技术要求，
- 为利用氢能源奠定坚实和系统的技术基础。

12. The hydrogen energy standard formulation's goal

- The hydrogen energy standard formulation's goal is
- To raise an identical technological requirement for production, storage and utilization in the processes of hydrogen energy development and utilization
- On a large scale, to lay a solid and systematic foundation
- for hydrogen energy's application

13. 任务总体框架

- 制订氢能源标准应该完成以下标准制订工作：
- 产品氢的品种、规格、质量、等级和安全要求。
- 产品氢的生产、检验、储存、运输、使用的方法和生产、储存、运输过程中的安全、卫生要求。

13. 任务总体框架

- 有关生产和使用氢的环境保护的技术要求和检验方法。
- 建设氢生产工程和建设氢运输工程的设计、施工方法和安全要求。
- 有关产品氢生产、运输工程建设和环境保护的技术术语、符号和代号。

13. The scheme of the hydrogen energy standards formulation

- The hydrogen energy standards should be formulated for the following technical requirements that need to be unified
  (1) varieties, specifications quality and grades of hydrogen products or requirements pertinent to safety and hygiene ;
  (2) methods for design, production, experimentation, examination, packing, storage ,transportation and utilization of hydrogen products or requirements pertinent to safety and hygiene in the course of hydrogen production, storage and transportation

13. The scheme of the hydrogen energy standards formulation

- (3) various technical requirements and methods for examination concerning environmental protection in hydrogen production and utilization;
  (4) technical requirements and methods for surveying, designing construction and examination and acceptance in building projects for hydrogen production and utilization;
  (5) technical terms, symbols, codes, drafting methods and requirements for conversion and coordination concerning hydrogen production, project construction and environmental protection;

14. 国家氢能源技术标准的具体内容

- 术语和定义；
- 不同形态和用途的氢的质量标准；
- 氢气生产规范；
- 提纯系统及其设备；
- 氢储存和递送系统及其设备和附件；
- 氢气工程的技术标准，包括：产氢站、氢气燃料站和传送管道等的规范；
- 氢气及杂质测试方法的安全规范和技术规范。

14. The contents of the national standard for hydrogen energy technology

- The contents of the national standard for hydrogen energy technology will include the following items
- Terms and definitions;
- The quality standard for hydrogen of various states and purposes;
- The specifications of hydrogen production;
- The purification system and their equipments;
- Hydrogen storage and delivery system, their equipment and accessories;
- The technical codes on H2 engineering including specifications for H2 generating station; H2 fueling station; delivery pipelines, etc
- H2 safety and technical criteria for testing methods for H2 and impurities and so on.

15. 国家氢能源技术标准制订的途径

- 上述各项标准将逐步建立。
- 所有标准都是以国内外氢气技术的研究、发展及应用为基础的。
- 氢气技术标准的制订将涵盖在中国氢技术标准技术委员会发布的
- “中国氢气技术标准实行计划”之中。

15. Approaches for establishment of technological standard of national hydrogenous energy sources

- The standards mentioned above are going to be established step by step
- All standards are based on the research, development and application on the inland or oversea.
- The establishment of hydrogen technological standard will be included in the “Working Program for China H2 Technology Standard”
- released by Technical Committee for China Hydrogen Technology Standards.

16. 制订氢技术标准的运行机构

- 中国标准研究院资源与环境标准化研究所
- 是ISO/TC197 氢技术标准委员会的成员。
- 此中心正筹备中国氢技术标准委员会的成立。
- 该委员会将建立“中国氢气技术标准行动计划”，并为预定计划做专门的准备。
- 该委员会及相关机构将共同承担氢技术标准的组织和准备工作。

16. The working organization for preparing standards for H2 Technology

- The Research Center of Energy and Environmental standardization under China National Institute of Standardization is the member of ISO /TC 197 Technical Committee for Hydrogen Technology Standardization.
- The center is busy preparing the establishment of Technology Committee for China Hydrogen Technology Standards.
- The Committee will start the effort to set up the “Working Program for China H2 Technology Standards”, and arrange for the specific preparation work as scheduled by the program.
- The committee and relevant organizations will make joint effort to organize the preparation of all standards for H2 technology.

17. 氢能源标准是强制性标准

- 中国标准按照性质可分为强制性标准和推荐性标准两类。
- 保障人体健康、人身、财产安全的标准和法律、行政法规，
- 规定强制执行的标准是强制性标准。
- 氢能源标准是强制性标准。代号为**GB**。

17. The hydrogen standards are compulsory standards

- National standards and trade standards shall be classified into compulsory standards and voluntary standards.
- Those for safeguarding human healthy and ensuring the safety of the persons and
- Of property and of property and those for compulsory execution as prescribed
- By the laws and administrative rules and regulations shall be compulsory standards.
- The others shall be voluntary standards.
- The hydrogen standards are compulsory standards with a mark of GB.

18. 氢能源标准的制订和执行由国家标准化管理委员会直接管理

- 遵照中国的法律，
- 国家标准化管理委员会是国务院授权履行行政管理职能，
- 统一管理全国标准化工作的主管机构。
- 中国所有的国家标准都归口国家标准化管理委员会直接管理。
- 氢能源标准的制订和执行也由国家标准化管理委员会直接管理。

18. The SAC executes directive administration in hydrogen standards

- The Standardization Administration of China (SAC) is
- Authorized by the State Council and under the control of AQSIQ to exercise the Administrative functions and
- Carry out centralized administration for standardization in China.
- The Standardization Administration of China (SAC) shall execute unified administration of all the work of standardization in China.
- The SAC executes directive administration in hydrogen standards' formulation and implementation.

19. 制订氢技术标准的具体步骤

- 在中国国家标准化管理委员会的指导下，
- 在专门技术组织和中国氢技术标准技术组织和技术委员会的安排下，
- 着手标准的准备。
- 各研究中心、大中院校和企业将组成专门的小组来拟订“征求意见稿”。
- 以此为基础，起草标准的初步草案并交所有的专家审阅。
- 最后再正式完成草案以提交国家质量监督检验检疫总局审查。

19. The particular procedure of hydrogen technology standards' formulation

- The standards will be prepared and formulated under the direction of SAC,
- Some specific technical organizations and the Technical Committee for Hydrogen Technology Standards of China
- The research centers, colleges and universities and enterprises will form specific groups to prepare the "Draft for Soliciting Comments".
- Based upon the comments the first draft of standards shall be written out for review by all the professional specialists.
- At last a formal draft shall be completed and submitted to AQSIQ for examination.

20. 标准制订的基本原则

- 反映国内外氢气技术的进步。
- ISO/TC 197将给出统一标准或者可优先应用的参考标准。
- 发达国家出版的标准可以参考。
- 如果上述条件不具备，标准准备工作将以国内相对先进以及
- 世界上类似的技术、系统、设备和附件的调研和分析为基础，以提高国内氢气技术的发展。

20. The basic principles to be followed for the standards preparation

- The advancement of H2 technology both at home and abroad shall be reflected in the standards items
- In preparation of standards, ISO/TC 197 shall give the identical standards or a reference to relevant standards already available priority.
- Some standards published by developed countries are also refereed.
- If the above conditions not available
- Preparation of standards should be based upon careful survey and analysis on
- The domestic relatively advanced technology, system, equipment and accessories
- And worldwide similar ones so as to promote the development of national H2 technology.

21. 总结既有经验，反映实际情况

- 国内氢气技术的实践经验应该以实践、现实的方式来研究总结。
- 充分利用氢技术方面的国家标准、行业标准和公司标准。
- 充分反映国内的技术水平、生产过程、附属设备以及原料的实际状况。

21. Summing up the existing experience and reflecting practical situations

- The practical experience in H2 technology at home
- Should be studied and summed up in a practical and realistic manner
- Full use will be made of the existing national, industrial and company standards for H2 technology.
- The standards should reflect the practical situation of
- The domestic technology, production processes, accessories and materials
- And so on.

22. 重点在于安全的保证

- 氢气易燃。点火能量小，可以在很大的混合范围内发生爆炸。
- 要保证氢气生产、储存和运输的安全。
- 安全标准的重点应着眼于氢气系统、设备、附件及管道的安全和可靠。
- 安全的预防和技术测量应该在标准中清晰、明确的给出。

22. Emphases should be given to the safety and reliability

- H2 is flammable.
- It is of less energy for ignition and has a wide range for explosion.
- The safety of H2 in production, storage and delivery must be ensured.
- Emphases should be given in standards preparation to the safety and
- Reliability of H2 system, equipment, accessories and pipelines
- Precautions and technical measure for security should be clearly and completely defined in the standards.

23. 全面的考虑和部署

- 通盘分析和考虑：
- 标准的实际作用
- 国内外氢气技术发展
- 清洁资源的迫切需要
- 更为实际的标准
- 例如涉及氢气生产系统、产氢站、燃料站及其安全的氢气标准，首先满足：
- 燃料电池汽车的要求
- 为氢气供应系统的构造和操作提供方便可靠的条件

23. Careful analysis and comprehensive consideration

- Careful analysis and comprehensive consideration should be given to:
- The practical functions of the standards
- The development of H2 technology at home and aboard
- The urgent needs for clean energy resources
- More practical items of H2 Standards, such as
- H2 generation system, H2 generation station, fuel station and safety standards.
- The standards should be first prepared
- To satisfy the demand for test and application of fuel cell powered automobiles
- To provide basis for the construction and operation of H2 supply systems

24. 正在征求意见的氢技术相关标准

- 电解水制氢系统技术要求
- 变压吸附提纯氢系统技术要求
- 氢气站设计规范
- 到目前为止，草稿已经就绪，准备提交征求意见，此前已经交相关单位和个人审阅。
- 以上三条标准的评审将在2004年底完成

24. Three hydrogen standards ready for comments soliciting

- Specifications of water electrolyte system for producing hydrogen
- Specifications for hydrogen purifying system on pressure swing adsorption
- Design code for hydrogen station
- So far, the drafts are ready for comments soliciting and already circulated to relevant units and individuals for comments.
- It estimated that the review on the above three standards will be completed by the end of 2004.

25. 电解水制氢系统技术要求的主要内容

- 范围
- 相关标准引用
- 术语和定义
- 电解水产氢系统：通用要求；基本参数；运行环境；产品型号
- 单体设备：发生规范；水电解；加压容器；氢气储存器；氢气压缩机；氢气纯化器；压力调节器/阀；氢气开关阀；阻火器。
- 管道及附件：材料的选择；管道及附件的布置；氢气流量；管道支承；冷却水管道。
- 电子设备及附件：直流动力供给装置；便携式电解水生产氢气系统；接地。
- 自动控制和监视

25. 电解水制氢系统技术要求的主要内容

- 装配和安装
- 测量和检测方法：试验前准备，试验方法，性能参数测量，测量和试验要求
- 标记
- 装备附属文件：搬运和吊装要求；系统图纸；操作手册；维护指南。
- 包装
- 附录：
- A 计算气体产量的电流测量方法
- B 计算气体生产量的体积法
- C 测量气体纯度的分析仪器

25. The main contents of Specifications of water electrolyte system for producing hydrogen

- Scope
- Relative Standards Quoted
- Terms and Definitions
- The water electrolyte system for producing hydrogen
- General specifications; Basic parameters; Operating conditions; Product model
- Unit:
  generate specifications; water electrolyser; pressurized vessel; H2 storage tank; H2 compressor; H2 purifier; pressure regulator/valve; H2 shut-off valve; Fire arrestor.
- Pipeline and accessories:
- Selection of material; arrangement of pipeline and accessories; H2 flow rate; pipe support; cooling water pipeline
- Electrical equipment and accessories ;
  DC power supply setup; portable electric for water electrolysis H2 production system; Earthing;
- Automatic control and monitoring

25. The main contents of Specifications of water electrolyte system for producing hydrogen

- Assembly and installation
- Methods for measurement and test
- Preparation prior to test; testing methods; measurement of performance parameters; Requirement for measurement and test.
- Sign
- Document to be completed with equipment
- Requirement for handling and lifting; shop drawings of system and equipment; Operation manual; Maintenance manual
- Packing
- Appendix:
- A Electric current measurements method for calculating gas throughput
- B Volume method for calculating gas throughput
- C Analysis instrument for measuring gas purity

27. 变压吸附提纯氢系统技术要求的主要内容

- 范围
- 相关标准引用
- 术语和定义
- 变压吸附提纯氢气的系统：一般规范；基本参数；操作环境；产品规范；
- 单体设备：一般规范；吸收器单元；真空泵单元；压力容器，氢气储存器；氢气压缩机；氢气净化器；可编程逻辑控制阀；阻火器。
- 管道及附件
- 电子设备及附件
- 自动控制和监视
- 装配和安装

27. The main contents of specifications for hydrogen purifying system on pressure swing adsorption

- Scope
- Relative Standards Quoted
- Terms and Definitions
- Pressure Swing Adsorption Purifying H2 Generating System: General specifications; Basic parameters; Operating conditions; Product model.
- Unit
  Generate specifications; Adsorption package unit; Vacuum pump package unit; Pressurized vessel; H2 storage tank; H2 compressor; H2 purifier; Programmable logical control valve; Fire arrestor;
- pipeline and accessories ;
- Electrical equipment and accessories
- Automatic controller and monitor
- Assembly and installation

29. 氢气站设计规范的主要内容

- 总则
- 术语
- 总平面布置
- 工艺系统
- 设备选择
- 工艺布置
- 建筑结构
- 电气及热工控制

29. 氢气站设计规范的主要内容

- 防雷及接地
- 给水排水及消防
- 氢气管道
- 附录:
- 氢气站内爆炸危险区域的等级范围划分
- 厂区、氢气站及车间架空氢气管道与其它架空管线之间的最小间距
- 厂区直接埋地氢气管道与其它埋地管线之间的最小距离
- 本规范用词说明

29.The main contents of design code for hydrogen station

- General provisions
- Terms and Definitions
- Planimetric arrangement
- Technique system
- Selection of Equipments
- Technique arrangement
- Architecture structure
- Electrical control and thermal control

29.The main contents of design code for hydrogen station

- Lightening protecting and earthing
- Water supply and dewatering, extinguishing
- H2 pipeline
- Appendix:
- The grade classification of dangerous districts in the hydrogen station .
- The minimum distance between hydrogen pipelines and other overhead pipes in plant area, H2 Station and workshops
- The minimum distance between buried hydrogen pipelines and other buried pipes in plant area
- Elucidation of the code

30. 结　论

- 氢气技术标准的制订是一项技术性工程，必须科学、求实、创新并符合法律规则。
- 它的制订需要严格的步骤和细致的工作，
- 制订氢气技术标准的任务繁重，责任重大。
- 在中国国家标准化管理委员会及其附属机构自始至终的指导、安排、组织下，将为氢气技术标准的全面制订和完成努力。

30. Conclusions

- The preparation of standards for H2 technology is a technical project.
- It need be scientific, practical, innovating and conforming to laws and rules.
- It requires a rigorous approach, careful effort and bears lots of responsibilities.
- We are determined to continue our effort to the preparation of other standards.
- Under the direction of the Standardization Administrative of China and through the arrangement and organization of the counterpart, we'd do our best to finish the hydrogen standards formulation.